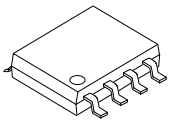
USB DEDICATED CHARGING PORT CONTROLLER WITH QC 2.0 FAST CHARGING FUNCTION



SOP-8

■ DESCRIPTION

The UTC **UCHQ200** is a fast charge protocol controller and follows Quick Charge 2.0 specification for smart power bank application. The protocol feature monitors USB D+/D- data line voltage, and automatically adjusts output voltage of power bank and wall adaptor to optimize charge time.

UTC **UCHQ200** is a high performance solution for fast-charging mechanism and it saves charging time. It supports the full output voltage range of either Class A or Class B. Optionally Class B can be inhibited for protecting the battery charger from accidental damage.

UTC **UCHQ200** can support not only USB BC compliant devices, but also Apple / Samsung devices and automatically detects whether a connected powered device (PD) is Quick Charge 2.0 capable before enabling output voltage adjustment. If a PD not compliant to Quick Charge 2.0 is detected the **UCHQ200** disables output voltage adjustment to ensure safe operation with legacy 5V only USB P_Ds.

■ FEATURES

* Fully Supports Quick Charge 2.0 specification:
  Class A: 5V, 9V, 12V Output Voltage.
  Class B: 5V, 9V, 12V, 20V Output Voltage.
* Supports USB DCP Shorting D+ Line to D- Line per USB Battery Charging Specification, Revision 1.2.
* Meets Chinese Telecommunication Industrial Standard YD/T 1591-2009.
* Supports USB DCP applying 2.7V on D+ line and 2.7V on D- line.
* Supports USB DCP applying 1.2V on D+ and D- lines.
* Automatic selection of D+/D- mode for an attached device.
*Compliant with Apple and Samsung devices.

■ ORDERING INFORMATION

Ordering Number	Package	Packing
UCHQ200G-S08-R	SOP-8	Tape Reel

UCHQ200G-S08-R

(1)Packing Type	(1) R: Tape Reel
(2)Package Type	(2) S08: SOP-8
(3)Green Package	(3) G: Halogen Free and Lead Free

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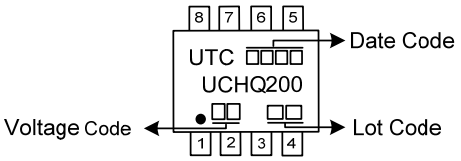
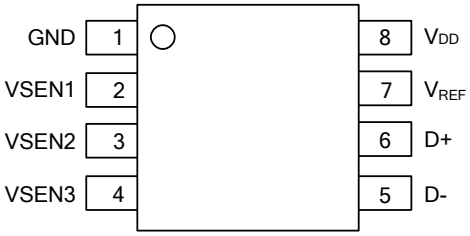
■ MARKING INFORMATION

PACKAGE	VOLTAGE CODE	MARKING
SOP-8	05: 5.0V 09: 9.0V 12: 12V 20: 20V	

■ PIN CONFIGURATION



■ PIN DISCRIPTION

PIN NO	PIN NAME	DESCRIPTION
1	GND	Ground Pin.
2	VSEN1	Open Drain Output of output voltage adjustment switch. Active for 9V, 12V, 20V output setting.
3	VSEN2	Open Drain Output of output voltage adjustment switch. Active for 12V, 20V output setting.
4	VSEN3	Open Drain Output of output voltage adjustment switch. Active for 20V output setting.
5	D-	USB D- data line input
6	D+	USB D+ data line input
7	V_{REF}	Internal Reference Voltage Output Pin. It must be with a resistor to GND
8	V_{DD}	Power Supply Input Pin.

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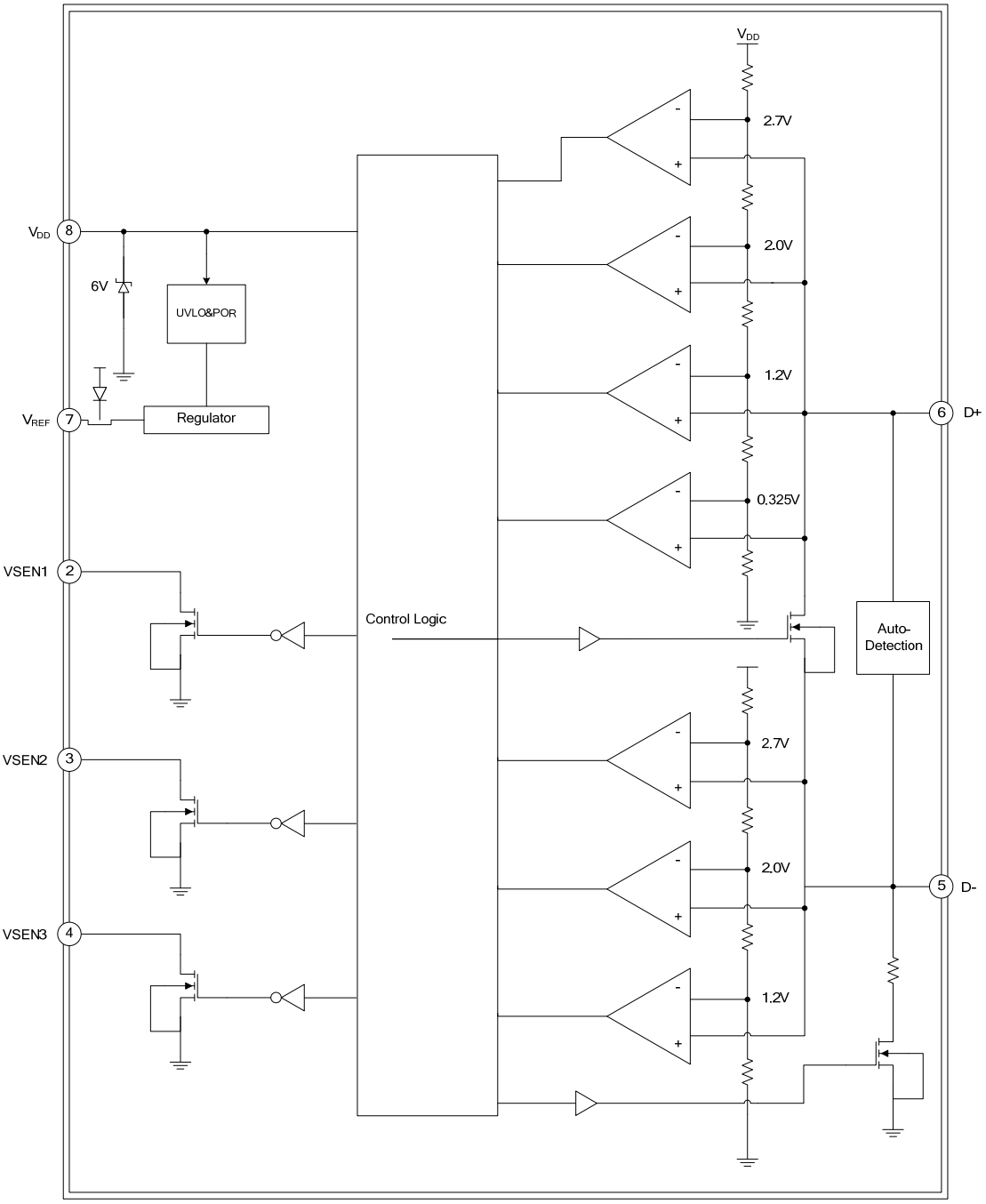
■ BLOCK DIAGRAM



■ OUTPUT VOLTAGE LOOKUP TABLE

D+	D-	Output Voltage	Internal Switch Setting		
			SW1	SW2	SW3
3.3V	3.3V	20V	0	0	0
0.6V	0.6V	12V	0	0	1
3.3V	0.6V	9V	0	1	1
0.6V	GND	5V(Default)	1	1	1

Note: 1 represent the NMOS are OFF, 0 represent the NMOS are ON.

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■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	RATINGS	UNIT
Input Supply Voltage	V_{DD}	-0.3 ~ +8.0	V
All Other Pins Voltage		-0.3 ~ +8.0	V
Storage Temperature	T_S	-65 ~ + 150	°C

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged.

■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input Supply Voltage	V_{DD}	Operating	4.0		6.0	V
Operating Temperature Range	T_{OPR}		-40		+85	°C

■ ELECTRICAL CHARACTERISTICS (V_{DD}=5V, T_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input Voltage Range	V_{DD}		4		6	V
Input UVLO Threshold	$V_{UVLO(VTH)}$	V_{DD} Rising	2.0		4.2	V
V_{DD} Supply Current		V_{DD}=5V,Measure V_{DD}, SW1=SW2=SW3=off		600		uA
V_{DD} Shunt Voltage	$V_{DD(SHUNT)}$	IV_{DD}=3mA		6.4		V
Reference Voltage Output	V_R		1.18	1.23	1.28	V
High Voltage Dedicated Charging Port (HVDCP)						
Data Detect Voltage	$V_{DAT(REF)}$		0.25	0.325	0.4	V
D+ High Glitch Filter Time	$T_{GLITCH(BC)-D+\ H}$		1000	1250	1500	ms
Output Voltage Glitch Filter Time	$T_{GLITCH(V)CHANGE}$		20	40	60	ms
D- Pull-Down Resistance	$R_{D-(DWN)}$			20		kΩ
Switch SW1 on-resistance	$R_{DS\ ON\ N1}$	SW1=200uA			300	Ω
Switch SW2 on-resistance	$R_{DS\ ON\ N2}$	SW2=200uA			300	Ω
Switch SW3 on-resistance	$R_{DS\ ON\ N3}$	SW3=200uA			300	Ω
Switch SW5 on-resistance	$R_{DS\ ON\ N5}$	SW5=200uA			40	Ω
DCP 1.2V Charging Mode						
$D_{+\ 1.2V}$/$D_{-\ 1.2V}$ line output voltage			1.08	1.2	1.32	V
$D_{+\ 1.2V}$/$D_{-\ 1.2V}$ line output Impedance				100		kΩ
Apple 2.4A Mode						
$D_{+\ 2.7V}$/$D_{-\ 2.7V}$ line output voltage			2.57	2.7	2.84	V
$D_{+\ 2.7V}$/$D_{-\ 2.7V}$ line output Impedance				33.6		kΩ

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■ APPLICATION INFORMATION

Function Description

The UTC **UCHQ200** is a USB Dedicated Charging Port Controller can fast charge most of the handheld devices. It can be like the original charging adapter. The **UCHQ200** can support BC1.2, Apple Divider mode, Samsung device.

The UTC **UCHQ200** is a low cost USB high voltage dedicated charging port interface IC for Quick Charge 2.0 specification. It also supports full output voltage range of Quick Charge 2.0 Class A or Class B.

Quick Charge 2.0 Interface

Power up D+/D- is supply 2.7V to Apple Device and then supply D+ short to D- into BC1.2. Set the output voltage level 5V. If D+ continuous above 0.325V and keep 1.25 seconds **UCHQ200** into Quick Charge 2.0 operation mode.

The output voltage (12V) can be inhibited by connect VSEN2 to V_{DD}. The output voltage (20V) can be inhibited by connect VSEN3 to V_{DD}.

If P_D without QC 2.0 the device will keep output voltage level 5V guarantee safe operation for only 5V USB PD.

Shunt Regulator

The wide power supply output voltage through external resistor from RV_{DD} to VIN. The internal with Zener-Diode clamp V_{IN} pin at 6.4V. RV_{DD}=2.2KΩ and CV_{DD}=1uF. R_{REF}=127 KΩ.

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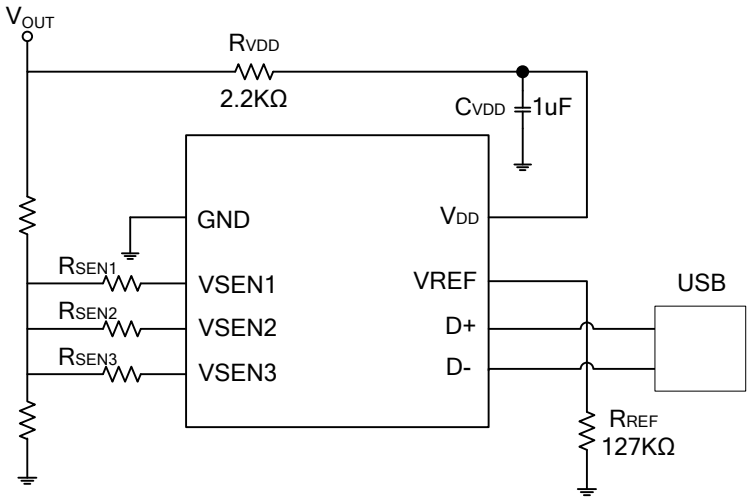
■ APPLICATION CIRCUIT



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